

SMITHSONIAN zoo goer

Published by **FRIENDS OF THE NATIONAL ZOO**
MAY | JUNE | 2010

MAKING BABIES

Zoo breeding is more
about research than romance.

- » **Birding at the Zoo**
- » **Japanese Giant Salamanders**
- » **Classes and Events**



Good day.

Great day.

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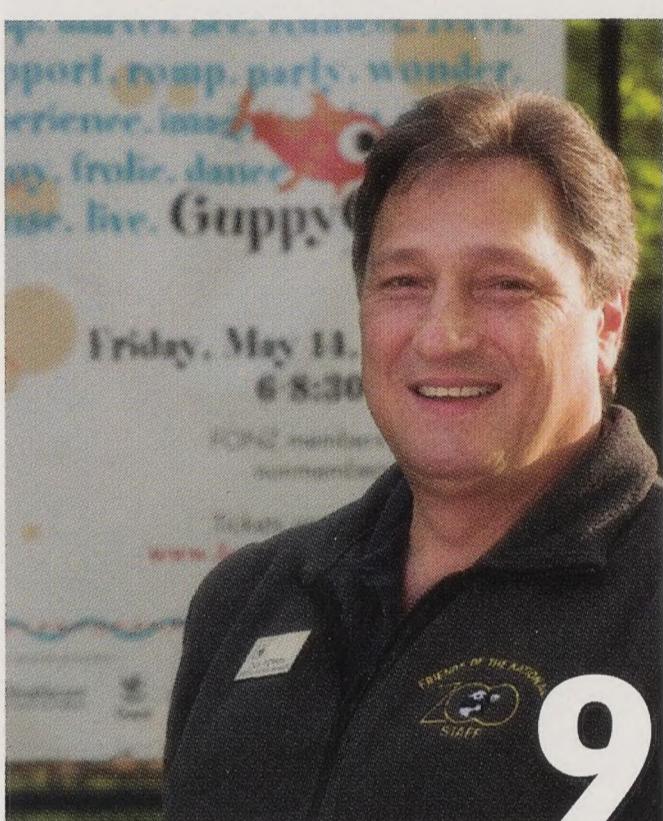


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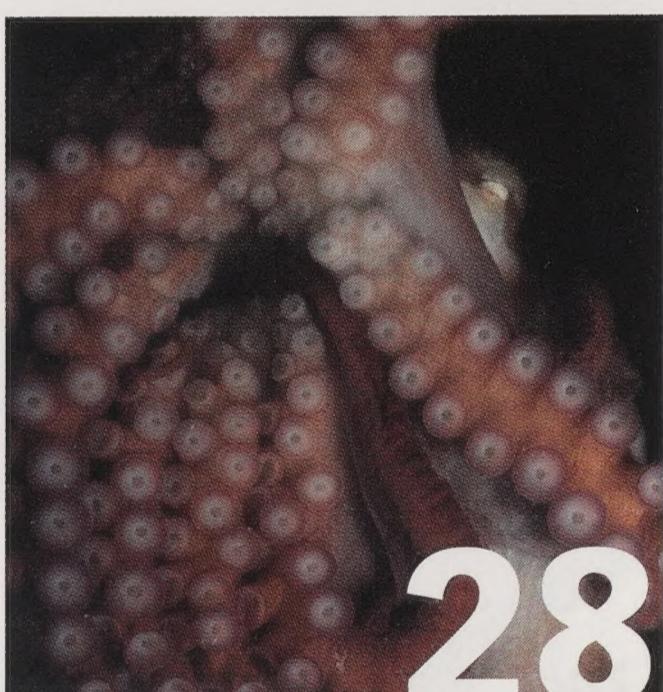
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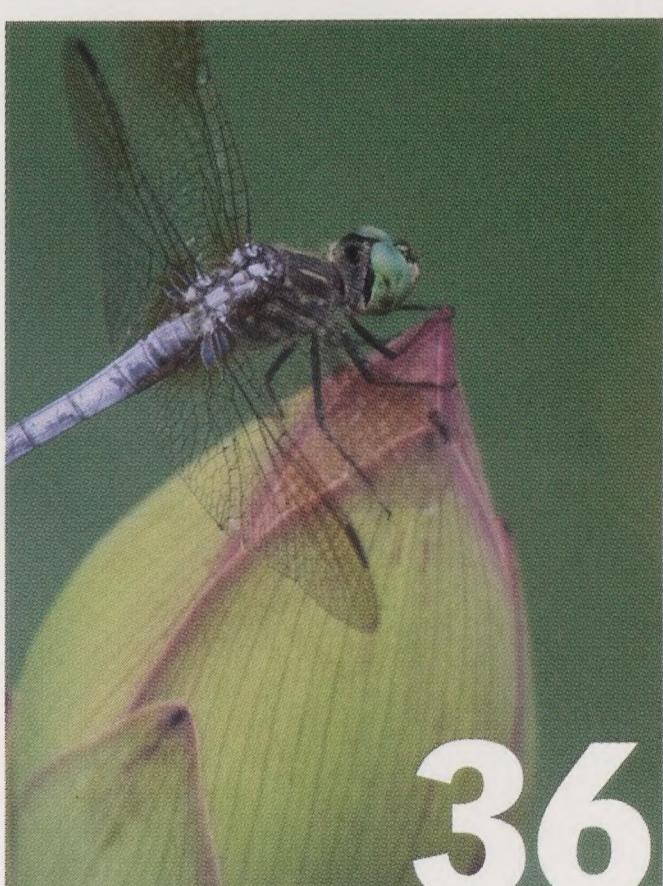
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SMITHSONIAN Zoogoer

FONZ

Friends of the National
ZOO

is the dedicated partner of the Smithsonian's National Zoological Park. FONZ provides exciting and enriching experiences to connect people with wildlife. Together with the Zoo, FONZ is building a society committed to restoring an endangered natural world. Formed in 1958, FONZ was one of the first conservation organizations in the nation's capital.

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On the cover: Kandula, a young male elephant, was born at the Zoo in 2001. PHOTO BY JESSIE COHEN/NZP

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INVITATION TO TRANSFORMATION

DURING MY DAILY WALKS IN THE ZOO, I SEE THE GROWING SPRING CROWDS ON OLMSTED WALK.

Watching people flock to the Smithsonian's National Zoo is a delight—and a challenge. How, I keep asking myself, do my colleagues and I ensure that our visitors have the best experience possible?

My standards for that experience are high. I want a visitor's time at the Zoo to be beyond enjoyable, more than educational. I want every visit to be transformational. I want people to leave our gates with a deeper knowledge of animals and a stronger commitment to saving them. That's a bold vision. Yet we must achieve it.

Creating a transformational visitor experience has two key facets: environment and engagement. In the National Zoo context, the environment is everything that a visitor encounters: exhibits, landscape, facilities, signage, our website, and more. Engagement is the visitor's interactions with everyone he or she meets, from keepers and interpreters to shop clerks and food staff. Everyone and everything must work in tandem to create rich and rewarding visits.

Maintaining and enriching the Zoo environment is one of my top priorities as director. Research has shown that learning—an essential ingredient in any transformational Zoo visit—is more effective in a friendly, inviting environment. That raises questions large and small. How do we best present our animals in a way that meets their needs yet also makes them accessible to visitors? Are our facilities adequate and in prime condition? Do our exhibit graphics communicate effectively to diverse audiences? Are there better ways to use new technology to convey information? Do our maps and signs provide clear guidance to visitors?

Those are just a few of the issues my colleagues and I wrestle with in the effort to make the Zoo environment as visitor-friendly as possible. We've begun sketching out some bold answers to those questions, and I will share them as plans become more concrete.

Engagement is equally important. Few things have more impact on our visitors than interactions with our staff. It may be a keeper whose friendly, informative presentation introduces a visitor to a new species. It may be a volunteer who provides cheerful, engaging replies to questions. It may be a genial clerk in one of our shops, who patiently helps a child find the perfect souvenir. Each of them becomes the face of the Smithsonian's National Zoo.

From that face, visitors draw vital clues about what kind of place the Zoo is. When the Zoo staff our visitors meet are committed and passionate about the Zoo's mission, they project the message that the Zoo matters, that our work is important. When staff and volunteers connect successfully with the public, they invite visitors into greater engagement with the Zoo. That will lead visitors to watch the animals more attentively, to return for more visits, to support the Zoo's work, to become involved in conservation efforts. Those are the seeds of transformation.

Finally, I believe it's important to make our visitors' experience as integrated as possible. The website where they plan a visit, the appearance and attitudes of the people they encounter, the exhibit text they read, the opportunity to recycle, the maps and souvenirs they bring home, and myriad other aspects of the Zoo experience all must work together to create an environment in which visitors are engaged, enlightened, and transformed.

Sincerely,

Dennis Kelly

Director, Smithsonian's National Zoological Park



MEHGAN MURPHY/NZP

COME TOGETHER



JESSIE COHEN/NZP

“IN THEY ALL CAME, ONE AFTER ANOTHER; some shyly, some boldly, some gracefully, some awkwardly, some pushing, some pulling; in they all came, any how and every how.” Those words from Charles Dickens could easily describe the scene at our gates on a warm spring day.

Watching people stream into the Zoo, I’m constantly struck by the diversity of our audience. In come families of different races and cultures. In come neighbors for whom the Zoo is the local park. In come visitors from around the globe. In come the young, the old, and everyone in between.

Given all that, I think it’s no exaggeration to say that the Zoo is one of the most diverse spots in Washington. Not only do we boast some 400 different species, but we draw *Homo sapiens* together in a way that’s sometimes still rare for our city and our world. I’m heartened when our diverse visitors can share experiences: the thrill of a lion’s roar; the strength, agility, and athleticism of orangutans; or the teamwork and intelligence of small-clawed otters. For a moment, we are all one in our humanity. And I’m proud to be part of an organization that provides a warm welcome to the Zoo’s diverse guests.

That welcome is available every day, as the Zoo buildings stay open till 6 p.m. But this spring and summer will offer some special opportunities to come together at the Zoo. On May 20, ZooFari will give visitors a literal taste of D.C.’s culinary diversity. More than 100 restaurants and vintners will offer samples of their creations at our annual fundraising gala. Live music and a fabulous silent auction will round out what Gus DiMillo of Passion Food Hospitality (whose restaurants include DC Coast, TenPenh, Ceiba, and Acadiana) calls “one of the most fun events every year.” You can learn more at www.fonz.org/zooafari.htm.

July 10 will bring a new, free event: Family Garden Day. It will feature gardening displays, opportunities to learn how plants and animals coexist, information on how to improve your own garden, activities for kids, and more. See p. 31 to learn more.

Soon afterward, on July 15, our adult visitors get an unusual opportunity to support the Zoo’s conservation efforts—by drinking beer. Our popular Brew at the Zoo event offers samples from area breweries accompanied by live music. See p. 8 to learn more.

Finally, our Sunset Serenades series of free concerts will take place on three Thursday evenings: July 22, July 29, and August 5. Like our visitors, the music is diverse, including jazz, folk, blues, and rock and roll. Gather on Lion/Tiger Hill with a picnic supper or food and beverages from our Zoo vendors. The music starts at 6:30 p.m. and runs till 8 p.m.

Whatever draws you to the Zoo—our everyday opportunities to see wildlife; the lush, green lure of the park; a special event—my colleagues and I will welcome you. We hope you’ll come away with a renewed appreciation for diversity—of animals, of plants, of people.

Sincerely,

Bob Lamb

Executive Director, Friends of the National Zoo



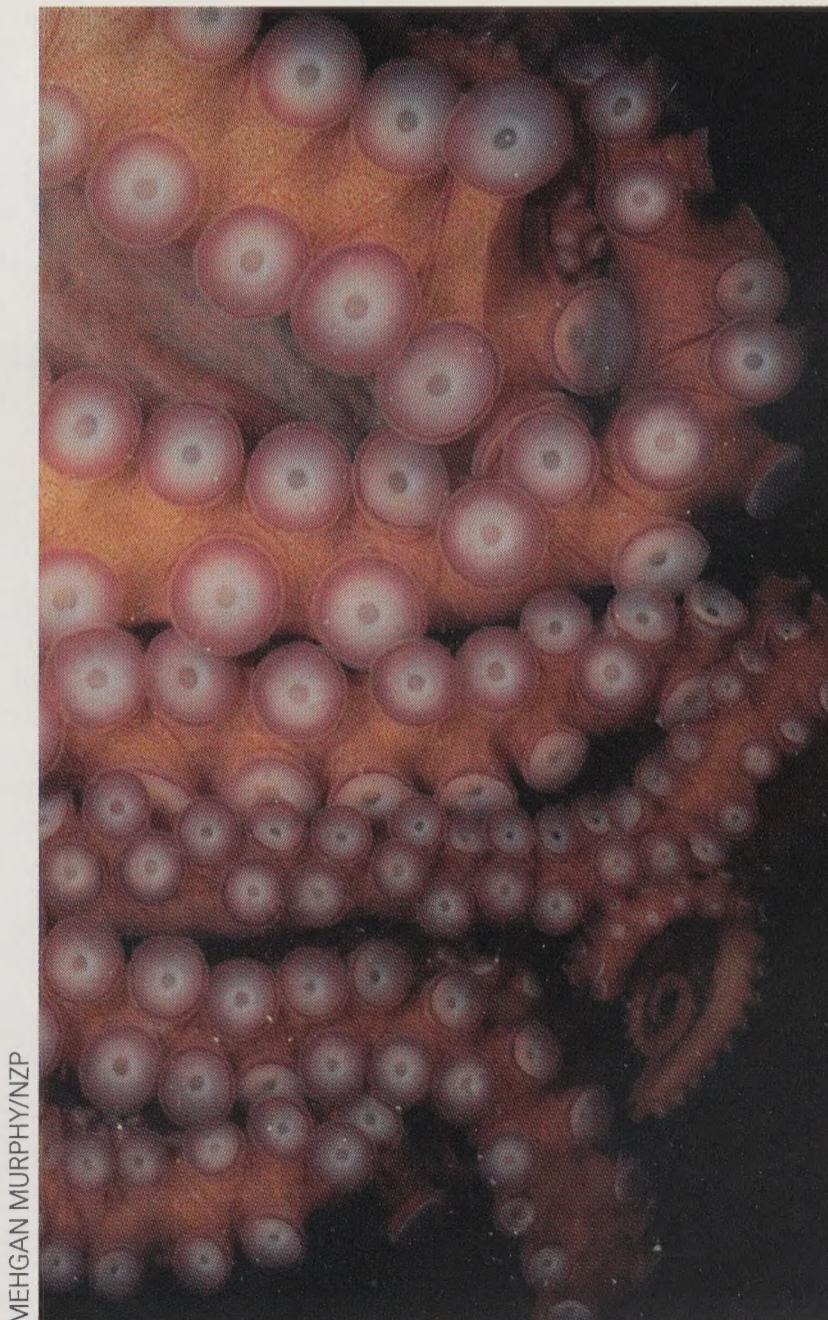
MEGAN MURPHY/NZP

CLOUDED LEOPARD CUBS

This past Valentine's Day brought a special gift to the National Zoo—a pair of genetically valuable clouded leopard (*Neofelis nebulosa*) cubs. The cubs, both male, were born at the Smithsonian Conservation Biology Institute in Front Royal on February 14. They brought the Zoo's clouded leopard population to 16. Two are on exhibit on Asia Trail; the rest live in Front Royal.

At birth, each cub weighed slightly more than half a pound. The young cats are "doing great," reports animal supervisor Ken Lang. In early April, they began eating their first solid food, boiled chicken.

You can support the Zoo's efforts to build a new clouded leopard facility by visiting nationalzoo.si.edu/support/annualappeal/cloudedleopards/.



MEGAN MURPHY/NZP

NEW OCTOPUS NAMED

This past winter, the Zoo acquired a new giant Pacific octopus (*Enteroctopus dofleini*). Visitors to our website were given the opportunity to vote on a name for this impressive invertebrate. There were four options: Olympus, Ceph, Octavius, and Vancouver.

Some 7,050 votes were cast, and the winning name, with 57 percent of the tally, is Octavius. It comes from the Latin word for "eight," which is fitting for an eight-armed animal. You can learn more about octopuses in the Creature Feature on p. 28.



An Anteater's Departure

Cyrano, the male giant anteater

(*Myrmecophaga tridactyla*) born at the Zoo in March 2009, left for Nashville earlier this year. His parents, Dante and Maripi, are on loan from the Nashville Zoo, which also owns any of their offspring.

MEGHAN MURPHY/NZP

As it happened, Cyrano had quite a special chauffeur—Rick Schwartz, director of the Nashville Zoo. Schwartz was in the D.C. area, so he drove Cyrano, held in a sturdy plastic carrier that the anteater could not shred with his claws, back to Nashville. Cyrano arrived safely at his new home and seems to be settling in well. Dante and Maripi have bred again this year, so the Zoo is hoping for a new young anteater.

Andean Bear Cub UPDATE

On March 24, veterinarians and keepers got their first hands-on look at the Andean bear (*Tremarctos ornatus*) cubs born at the Zoo in January. Zoo staff briefly separated the cubs from their mother to examine and vaccinate them. They also shaved a spot on each bear (one on the shoulder, the other on the hip) so that they can identify the cubs, which appear identical. The cubs' mother, Billie Jean, waited impatiently to be reunited with her young, whom she groomed calmly and carefully once they were together again. A later checkup revealed that one cub is male and the other female.



MEGHAN MURPHY/NZP

Brown Kiwi Chick

A brown kiwi (*Apteryx mantelli*) hatched in the Zoo's Bird House early in the morning on March 30.

The endangered animal, New Zealand's national bird, emerged from an egg laid on January 19. It weighed 258 grams. Unlike other bird species, a kiwi hatches fully feathered and ready to cope with life on its own. Young kiwis receive no parental care. The young chick, a female, appears to be in good health—"a very lively and talkative chick," says keeper Kathy Brader.

Kiwis in captivity are extremely rare, and females are rarer still.

Only five zoos outside New Zealand have bred the flightless birds, and the National Zoo currently has the only breeding female in the United States.



MEGAN MURPHY/NZP

Maned Wolf Pup

A female maned wolf (*Chrysocyon brachyurus*) pup was born at the Zoo's Front Royal, Virginia, campus on January 17. Her mother, Nuch, did not give birth last year, explains animal supervisor Ken Lang, so it was "good news to get a pup this year."

This pup was a single offspring, which is fairly unusual for canids, says Lang. She appears healthy and has been busily exploring the enclosure she shares with Nuch and her father, Paul.



MEGAN MURPHY/NZP

Improved Shopping and Dining

Spring has brought some welcome changes to the Zoo. The Panda Shop is sporting a whole new look, including a layout designed to improve traffic flow and an array of appealing new products. The renovation featured Earth-friendly touches, such as tiles containing recycled material and a ceiling fan that reduces the need for air conditioning.

The Zoo is also becoming a tastier place to visit. The Panda Overlook Café will offer panini, and the Mane Restaurant will soon boast a fresh salad bar.

Mark Your Calendar

May 20 **ZooFari: A Panda Bear Affair**
See ad on p. 26.

June 3 **Science on Tap**
Learn more on p. 32.

July 10 **Family Garden Day**
See ad on p. 31.

July 15 **Brew at the Zoo**
See ad below.

July 22 **Sunset Serenades**
Our free, three-Thursday concert
series begins at 6:30 p.m. on
Lion/Tiger Hill.

Notes to Our Readers

Correction: Through an editing error, we reported in our last issue that Ling-Ling and Hsing-Hsing, who came to the National Zoo in 1972, were the first pandas in a U.S. zoo. They were not. The Brookfield Zoo in Chicago displayed pandas in the 1930s. *Smithsonian Zoogoer* regrets the mistake.

What's That Smell? To protect the magazine from scuffs and other damage in the binding and mailing processes, our printer coats the pages with a eco-friendly, water-based solution. It sometimes produces an odor. We assure readers that the smell is nontoxic and have found that it usually dissipates. We are working with our printer to explore ways to reduce the odor.

FOLLOW US ONLINE! Get breaking news, enjoy fantastic photos and videos, and connect with other fans of the Zoo.

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**Drink Beer.
Save Wildlife.**

FRIENDS OF THE  NATIONAL ZOO

Brew at the Zoo



THURSDAY, JULY 15, 2010 6:00-9:00 PM

Have fun while supporting a good cause! Head to the fourth annual Brew at the Zoo. You can try samplings from area breweries while you rock out to live music. Proceeds support the National Zoo's conservation programs. Get tickets at www.fonz.org/brew.htm. You'll go to bed happy and wake up the same. This is a 21+ event.

PARTY ANIMAL

Dan Pierron throws some of the wildest parties in Washington, D.C.—literally. The National Zoo is the only place in the District where residents and visitors can sample fine wines while gorillas playfully chase one another only a few feet away. Nowhere else can trick-or-treaters watch in awe while an Invertebrate Exhibit keeper tosses live crickets into a golden orb spider's tangled web.

Friends of the National Zoo (FONZ) hosts 15 special events every year, and Pierron's job as assistant director of corporate and special events is to help guests have an up-close and memorable encounter with animals, many of which are threatened or endangered in the wild. All of these events are offered for public education, membership appreciation, fundraising, or all three.

"When people attend an event at the Zoo—whether they're large FONZ events or private corporate picnics—they walk away with so much more than a fun time," Pierron explains. "The special events team's task is to bring together keepers, volunteers, education specialists, and grounds-keeping staff and create an atmosphere where kids and adults can learn about wildlife and conservation in unexpected ways."

Planning for these large events begins between six to ten months in advance. In that time, the special events team plans the games, special exhibits, and entertainment that will be featured at the events.

Pierron and his colleagues are constantly searching for new, inventive activities that will surprise Zoo visitors and spark their interest in wildlife conservation. This often involves organizing scavenger hunts, coordinating live animal demonstrations, and showcasing Zoo scientists' work in the field and at the Zoo.

Pierron's favorite event, Guppy Gala, takes place on May 14. "The kids have such a ball. There are so many great parts to this event from the rock climbing wall to the obstacle courses and mazes to the musicians and animal demonstrations. This year, Zoo vets will be performing check-ups on stuffed animals, so kids will learn how to care for their plush lions, tigers, or teddy bears!"

Interested in a career in special events planning? Pierron says the best way to get experience is to volunteer and help out at the Zoo's special events. Every duty—including setting up before the event, assisting with arts and crafts, monitoring an activity, and even dressing up as a panda—is just as important as the planning and preparations. "There isn't a part of the Zoo that we don't interact with," Pierron says. "We couldn't function without everyone's—and I mean everyone's—help!"

—JENNIFER ZOON



MEGHAN MURPHY/NZP

» In each issue of *Smithsonian Zoogoer*, this "How Do You Zoo?" page will showcase someone who works at the National Zoo. Learn more about careers at the Zoo by visiting the How Do You Zoo? exhibit at the Zoo's Visitor Center. Children ages five to ten can get a hands-on feel for different jobs at the Zoo. The exhibit is open most weekends from 10 a.m. to 4 p.m.



JESSIE COHEN/NZP



Some of the most
colorful creatures
you can see
at the Zoo
aren't part
of the collection.

BIRDING ZOO

at the  ZOO

BY HOWARD YOUTH



GERHARD HOFMANN



GERHARD HOFMANN



GERHARD HOFMANN

PREVIOUS PAGES: Black-crowned night-heron.
ABOVE: Magnolia warbler (top);
rose-breasted grosbeak (middle);
black-and-white warbler (bottom).
RIGHT: Indigo bunting.



Each distinct season
in Washington, D.C.,
offers **different birding
opportunities.**

The Smithsonian's National Zoo is a birder's delight.

Spanning 163 rolling acres of mature hardwood forest, creek shore, artificial wetlands, flower-filled gardens, and grassy open space, it offers a generous sampling of Washington, D.C.'s impressive avifauna, available year-round to anyone who cares to look and listen. Greg Gough, an avian ecologist at the Zoo's Smithsonian Migratory Bird Center, keeps a tally of wild birds seen in the park. It currently includes 159 species. "What I most enjoy is listening for the warblers in the old oaks in May," he says. The Zoo's bird list contains 33 warbler species, virtually all of which were observed during migration.

You will always see some wild birds during any Zoo visit. But if you bring binoculars, a field guide, and a notebook, you will find far more. Also, to get the most birds for the buck during your visit (and this shouldn't be hard, given the Zoo's free admission), it pays to employ some key birding tactics. Try to visit as many different habitats as possible. Keep your ears alert, as well as your eyes. Experienced birders "watch" with their ears. If you're not yet a song expert, you can start by writing down some phonetic notes on songs, the way you hear them. From fall through spring, for instance, the Zoo rings with the sound of wintering white-throated sparrows. Birders know this song as "Oh, sweet Canada, Canada, Canada," or "Old Sam Peabody, Peabody, Peabody." You might reach pariah status if you share such information at parties, but sound cues are valuable birding tools.

Another key to Zoo birding is time of year. Each distinct season in Washington, D.C., offers different birding opportunities. Winter begins with few birds singing. By February, this begins to change, as days grow longer and warmer. Spring brings migration and breeding. Young

birds leave their nests from late spring into summer, when rabbles of young starlings, house sparrows, and grackles appear along Olmsted Walk. Fall migration begins mid-August and continues into early December. Unlike spring migration, birds aren't singing, but there are more migrants due to the year's crop of young birds.

Walking the Walk

Olmsted Walk, the wide, wavy main path up and down the Zoo's impressive hill, is home to wild birds year-round. Some are hard to miss. For example, from April to October, you will see gray catbirds close by. These slate-gray birds with black caps often skulk around in shadowy tangles. But at the Zoo, they hop around on the pavement as they look for insects and other food. Common grackles, shiny and long-

tailed with piercing yellow eyes, also loiter around Olmsted Walk starting in February or early March. Mourning doves, house sparrows, and European starlings put in appearances year-round. Watch for American goldfinches in the flower beds.

Olmsted Walk passes many open areas, so keep your eyes to the skies. During hawk migration, in spring and fall, one or two red-tailed, red-shouldered, Cooper's, or sharp-shinned hawks may pass overhead. If you're really lucky, you might spot a passing bald eagle or a sleek American kestrel.

From late August into early September, common nighthawks may pass over, particularly close to dusk. Not really hawks, they resemble a cross between a small falcon and a very large swallow, with dipping flight and white wing patches. Swallows also pass through in small numbers, particularly barn swallows, which may be around in summer.

Here's some inside information on hidden birding hot spots along Olmsted Walk. "The scrubby area by the Reptile Discovery Center and the Think Tank is a nice spot to run into a ruby-crowned kinglet in winter, or robins, or white-throated sparrows, or even a thrasher," says Gough, who knows all corners of the Zoo property. From the Great Ape House down to Lemur Island, Olmsted Walk leads you close to forested ridges where you can watch for migrating warblers, flycatchers, and thrushes.

Lower down on the walk, sycamores line the way, from just below Great Cats down to Parking Lot D. Baltimore orioles

Join the Club!

Support conservation and get great benefits by joining the Smithsonian Migratory Bird Club. Members enjoy an annual bird walk with a Smithsonian scientist, lectures, and other special events. They also receive a fact-packed newsletter and a Bird Friendly Coffee baseball cap. Learn more at nationalzoo.si.edu/SCBI/MigratoryBirds/Club/.



and orchard orioles, along with eastern kingbirds, have nested in this area as well as around Lemur Island. The orioles' rich songs will lead you to these colorful treetop birds. The noisy, chattering kingbirds are often airborne and so should be easier to spot. Enjoy these birds in spring, while they are boisterous. By August, they will be drifting southward.

The Zoo's parking lots sit next to Rock Creek Park, which protects some of the region's tallest and oldest remaining hardwood forest. The edges of these lots are among the best places to find six local woodpecker species. From winter to early spring, woodpeckers will be easiest to see on the bare-branched trees. The largest is the crow-size pileated. This red-crested giant, inspiration for the famed cartoon character, is present year-round in small numbers. Listen for its loud, piping call. The smallest,

the sparrow-size downy woodpecker, may be seen anywhere in the Zoo.

The Bird House and Beyond

Birds live not only in the Bird House, but all around it. The artificial ponds in front and behind provide one of the few reliable wintering places for wild wood ducks in the city. Perhaps North America's most dazzling duck, the drake wood duck is the gaudy circus clown of waterfowl. It has a hammer-like head and a face that seems to be painted in white, green, black, and red-orange. Wild mallards are also around. On occasion, a few other wild ducks appear, such as an American black duck or a green-winged teal. This is also a fine spot to check the thick shrubbery for winter wrens and white-throated sparrows in winter and brown thrashers in early spring. Migrating warblers often appear in the river birch and

other trees that fringe the ponds and along the wooded slope behind the Bird House.

From April to October, the main avian draw around the Bird House is the night-heron rookery. This is the only place where black-crowned night-herons nest in the nation's capital. A few of these squat, white-bellied, black-backed birds first appear between mid-February and mid-March. This advance party soon vanishes. Then, in early April, the herons arrive en masse. In the treetops, dozens of pairs vie for space and compete for nesting materials. The following months bring lots of action too. Brown, white-spotted young birds appear in the stick nests, then loiter around the ponds or yards. By October, the night-herons are gone, likely headed to southern states or even the Caribbean.

The lower valley best matches the undulating forest habitat of adjacent Rock Creek Park, so it is another good place to watch for migrating thrushes, pileated woodpeckers, and other woodland species. A pair of red-shouldered hawks often nests nearby. In late fall and winter, American hollies growing in the woods may draw such berry-eaters as American robins and cedar waxwings and perhaps a shy hermit thrush.

Asia Trail is lavishly landscaped and accented by some large, mature trees. You may see ruby-throated hummingbirds at the flowers (as you may also along Olmsted Walk). During migration, the woodsy sloth bear exhibit at the top of the hill attracts migrating thrushes and wintering and migrating sparrows—including, on occasion, the white-crowned sparrow. You will likely see wild birds both in and alongside the exhibits here.

As Elephant Trails develops and other parts of the Zoo evolve, each change will bring new opportunities for the Zoo's wild birds. Just as the seasons always change, so does the tableau of feathered visitors. So keep your binoculars handy when you visit the Zoo. The more you visit, the more birds you will see. It just goes to show that the Zoo is not only popular with large numbers of human visitors but feathered ones as well. **SZ**

— HOWARD YOUTH, *former associate editor of this magazine, is writing a book on Washington, D.C.'s natural areas and wildlife.*

A BIRDER'S ALMANAC

January: Kinglets, brown creepers, winter wrens, and sapsuckers winter at the Zoo. Some wood ducks linger in ponds by the Bird House.

February: Some birds begin to sing, as days lengthen and warm snaps occur.

March: Red-shouldered hawks nest between the Bird House and the lower valley. Night-heron scouts appear, then disappear.

April: Catbirds, chimney swifts, swallows, and eastern phoebe arrive. Month's end brings first fledged young birds, even as the first long-distance migrants appear. Black-crowned night-herons nest.

May: Spring migration peaks during the first two weeks. More than 30 warbler species pass through the

area; so do cuckoos, scarlet tanagers, rose-breasted grosbeaks, flycatchers, and thrushes.

June: Birdsong and nesting are still in full force.

July: Young birds abound.

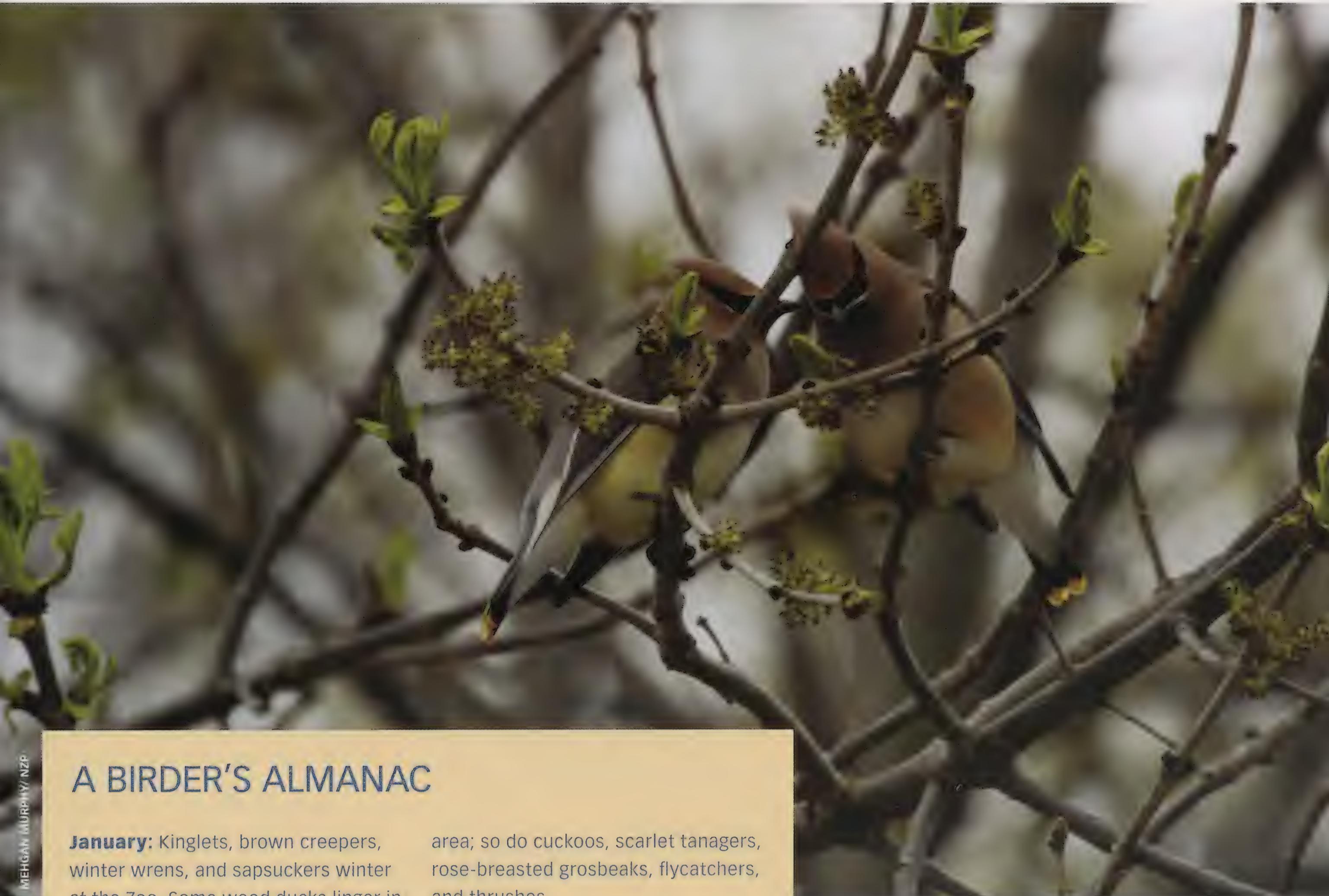
August: By mid-month, songbird migration starts; watch for nighthawks by month's end.

September: Neotropical migrants pass through; hawk migration starts.

October: Migration continues, as a few wintering species appear. Night-herons have gone.

November: Look for hawks, sparrows, and waterfowl on the move.

December: Leaves gone, it's easier to spot woodpeckers and hawks.



ABOVE: Cedar waxwings.
BELOW: Chestnut-sided warbler.



GERHARD HOFMANN

Asia Trail's newest inhabitants
aren't pretty faces.
But they are a dream come true.

SUPER SALAMANDERS

BY CAROLINE TREADWAY

Ever since curators at the Smithsonian's National Zoo heard about Japanese giant salamanders (*Andrias japonicas*), they've wanted them. Why? Because, as senior curator Ed Bronikowski puts it, "They're big, ugly, and cool as hell."

That zoological fascination fueled a nine-year odyssey that has joined two cultures on opposite ends of the Earth in striving to conserve this incredible amphibian. After nearly a decade of hard work, perseverance, and creative problem-solving, Bronikowski and chief veterinarian Suzan Murray brought six Japanese giant salamanders from the City of Hiroshima Asa Zoo to the National Zoo last December.

What are these supersize salamanders and why did the Zoo want them so badly? Well, the animals' name pretty much sums them up. Native to Japan, these salamanders are huge. They can grow longer than five feet and weigh upwards of fifty pounds. They are rumored to live for more than a century.

In Japan, these stream dwellers are called *hanzaki*, which means "half change." The Japanese revere their enormous amphibians, honoring them with temples, parades, and songs. They also protect the animals, deemed a "national natural treasure," by law.

Japanese giant salamanders are one of three species of cryptobranchids. Other

members of this family are Chinese giant salamanders (the world's largest amphibians, slightly larger than their Japanese cousins) and hellbenders (smaller salamanders native to the southeastern U.S.).

Hanzaki thrive in swift, cold mountain streams that eventually meander through farmland and cities in Japan. These sleek giants are perfectly designed for life in the aquatic fast lane. With wide, flat heads, camouflaged bodies, and rudder-like tails, the salamanders use grippy toe pads to maneuver on slick algae.

Salamander Secrets

What little is known about this exotic icon, American scientists have learned from Kazushi Kuwabara, the "godfather of the Japanese giant salamander." Since 1974, Kuwabara has scrupulously studied the salamanders, unraveled their intricate breeding secrets, and designed the Asa Zoo's salamander breeding grounds. The Asa Zoo was the first place in the world to breed Japanese giant salamanders in captivity—a testament to Kuwabara's salamander savvy.

Since the Asa Zoo sits smack in the middle of Japanese giant salamander territory, Kuwabara funneled nearby streams through the zoo's salamander grounds,



MEGAN MURPHY/NZP



COURTESY OF ED BRONIKOWSKI

FACING PAGE: Salamanders arrive at the Zoo. LEFT: Senior curator Ed Bronikowski and head veterinarian Suzan Murray admire a salamander.

BELOW: Japanese giant salamander (top); moving salamanders at the Asa Zoo (middle); Suzan Murray talks with Asa Zoo staff (bottom).



COURTESY OF ED BRONIKOWSKI



COURTESY OF ED BRONIKOWSKI



COURTESY OF ED BRONIKOWSKI

SUPER SALAMANDERS

providing the exact conditions—water quality and temperature—the salamanders would have in the wild. The method worked, and the Asa Zoo has bred hanzaki this way since 1979.

In mating season, Kuwabara has discovered, a male salamander travels to find a cavern in a sandy stream bank and excavates a large oval nest. The “den master,” as scientists call the breeding male, aggressively defends his nest from intruders. But when the right female slithers by, he immediately welcomes her in to mate.

After fertilization, the others leave, and the den master assumes responsibility for the eggs. He meticulously guards and cares for them. Even months after they hatch, he continues to tend the tiny larval salamanders, forgoing food. Besides humans, adult hanzaki have few predators, but juveniles make a tasty snack for birds, turtles, and snakes.

Kuwabara noticed that if the father leaves the nest, the young salamanders’ survival rate decreases dramatically. Does he secrete an anti-fungal chemical that protects his

for a fish or crab dinner to swim by. When it does, the salamanders deploy lightning reflexes. A mouthful of sharp, tiny teeth grasp the prey, which is swallowed whole.

“They’re really adorable until you think about putting your hand in front of their face,” says Zoo biologist and keeper Rick Quintero, who’s spent nearly every day with the salamanders in quarantine since they arrived at the Zoo. “Especially when you see them eat a fish. It’s a violent attack on anything near their face.”

But hanzaki can’t thank their tiny, lidless eyes for dinner. The salamanders hunt with a sixth sense akin to touch. Like most amphibians and fish, Japanese giant salamanders are wired with a web of motion sensors running down their sides. This “lateral line system” is studded with nerve endings that detect movement and electromagnetic fields. Heavily concentrated around the face and mouth, this heightened sensitivity makes hunting a snap, literally.

“If something is moving, they know it’s there, no matter how tiny it is,” says keeper Robin Saunders, who specializes in hell-benders. “And not only do they know it’s there, they know exactly where it is, how big it is, and how fast it’s moving.”

Hanzaki aren’t picky eaters. They forage on fish, crabs, invertebrates, and anything else that comes within reach, including mice, snakes, and occasionally each other. According to Saunders, salamanders near cities sometimes mistake plastic bags and other inedible items for prey.

Salamanders might eat trash in the wild, but certainly not at the Zoo, where nutritionists design strict diet plans based on weight and natural feeding habits to avoid obesity and disease. Each week, the hanzaki get a ration of raw fish—capelin, herring and smelt. As denizens of cold water, Japanese giant salamanders have slow metabolisms and don’t need to eat every day.

Salamander SOS

Hanzaki haven’t escaped the habitat destruction, pollution, and disease devastating amphibians worldwide. In a recent article, Smithsonian salamander specialist Jennifer Sevin wrote that the species is “susceptible to extinction by potential environmental fluctuations, and requires extensive conservation measures.”

What's Normal?

After arriving at the Zoo last December, the new Japanese giant salamanders went into quarantine, as is customary. For the Zoo’s veterinary staff, this was more than just a routine practice. It was an incredible learning opportunity. “Medically, we know very little,” says head veterinarian Suzan Murray. “We have to have a good understanding of what’s normal to recognize what’s abnormal. And there’s not a lot of information on normal values for the Japanese giant salamander. This is what we’re working on now.”

In the effort to learn what’s normal for hanzaki, vets have collected skin, fecal, and blood samples. Since so little is known about these animals, each sample is extremely valuable. “Every sample we get is unique,” says pathologist Tim Walsh. “Even if it seems like a normal skin sample, it’s not, because we’re still figuring out whether we’re going to use it for population genetics, genetic sexing, fungus cultures, bacterial studies. It’s so important to have rare animals like this in captivity because it gives you a chance to do that research over time.”

The Zoo extends this educational effort beyond its gates and shares expertise with other institutions, nationally and internationally, which is especially important with animals this rare. “In terms of medical issues, there’s very little known and published,” says Murray. “So this is an opportunity for us to utilize our resources to learn about the salamanders and contribute to conservation and medical issues.”

Scientists theorize that the den master quickly identifies breeding females by sense of smell, but that’s still a mystery.

In a unique display of external fertilization, the female giant salamander enters the den and lays a string of white eggs, which the male fertilizes with his sperm. The two begin a circular dance around the eggs and sperm, stirring them. The den master then allows other males and females to enter the nest and join the spawning circle.

young? This is just one of many questions Zoo scientists hope to explore. “The Japanese giant salamanders are curious animals that live differently from humans,” Kuwabara says. “I hope we can work together to understand their strange lives. I am sure we have a lot to learn about them.”

Amphibian Appetites

In the wild, hanzaki are ambush predators that blend into their surroundings and wait



MEGHAN MURPHY/NZP

But scientists responding to the global amphibian crisis have primarily focused on frogs. "The prettier the frog, the more attention it gets," says Bronikowski. "And we support frog conservation at the National Zoo. But we also want to focus on salamanders because not enough zoos, facilities, and aquariums are focusing on salamanders." To meet this challenge, the Zoo has joined the Association of Zoos and Aquariums' Cryptobranchid Interest Group and hopes to take a lead role in salamander science and breeding in the U.S.

The salamanders' slippery skin is a key part of the problem. Highly permeable and vascular, it allows for underwater breathing but also makes the animals extremely vulnerable to pollution. Zoo pathologist Tim Walsh says that even low levels of contaminants, over time, can cause problems for amphibians that are constantly bathed in toxins. "We worry about any kind of runoff that's getting into streams—herbicides, pesticides, or

With so many threats facing the Japanese giant salamander, the Asa Zoo and National Zoo have teamed up on a bold project—creating a breeding colony outside of Japan. Toward that end, the Asa Zoo gave six of its salamanders to the National Zoo. Will the animals agree to breed half a world away from home? Bronikowski hopes so. "We are keeping our fingers and toes crossed," he says. "Giant salamanders are like the giant pandas of the amphibian world."

Mike Davenport's Dream

The salamanders' arrival fulfilled a deeply held dream of Mike Davenport, a former curator. He helped design Asia Trail and desperately wanted it to include Japanese giant salamanders.

In 2000, Davenport drew up a curatorial agreement with the Asa Zoo. But endless permitting hiccups and delays prompted the Zoo to borrow a salamander from the Cincinnati Zoo for the exhibit's debut.

at the Reptile Discovery Center. This state-of-the-art system mimics key features of the Asa Zoo's. "It's really exciting to think outside the box and try to re-create environmental conditions from a natural stream that's halfway around the world," Quintero says.

Bronikowski and Quintero crafted every detail of each tank, plumbing system, and exhibit. They aimed to match the salamanders' wild environment in hopes of promoting future breeding success. The breeding facility alone required a panoply of mechanical, biological, chemical, and UV filters; new external plumbing; redundant water chillers; insulated reservoirs; and three independently operational tanks connected with tubes perfect for salamanders to wriggle through.

In the new facility, the salamanders enjoy the seasonal temperature variation and water flow they'd have in Japan. That's not all. Bronikowski brought stream samples back from Japan, as templates for

With so many threats facing the Japanese giant salamander, the Asa Zoo and National Zoo have teamed up on a bold project—creating a breeding colony outside of Japan.

fertilizers around farms," he says. "And in cities, a whole mixture of chemicals just washes off the street into streams, whether it's oil dripping from cars—petroleum products—or whatever's associated with nearby industry: heavy metals, organochlorines, and various chemicals."

Japanese giant salamanders must also contend with hybridization. Japanese farmers once imported the bigger, more aggressive Chinese giant salamander to raise for its valuable meat. (One giant salamander can reportedly sell for \$1,000.) Some Chinese salamanders escaped into the wild, where they both interbreed and compete with their Japanese cousins.

As salamander numbers dwindle, these iconic animals and their habitat need all the help they can get. In Japan, communities have begun to modify cemented irrigation ditches and dams that prevent breeding and foraging, making them more hanzaki-friendly.

Visitors loved the 50-year-old female salamander, but she soon died from chronic liver disease, despite painstaking efforts to save her. Keepers were heartbroken. And when Davenport retired in 2009, the Zoo was giant salamander-less.

Senior curator Ed Bronikowski inherited the "giant" challenge. He reinvigorated relations with the Asa Zoo and patiently forged through a jungle of red tape alongside registrar Laura Morse. "The amount of labor that goes into all this is just incredible," Bronikowski says. "And that's on both sides of the ocean. They're zoo people just like we're zoo people. Permitting is a necessary part of conservation to be sure, but it can be quite tedious."

While permits inched toward approval, Bronikowski had time to build the Zoo's entire salamander facility. He tweaked the Asia Trail exhibit, guided the installation of new quarantine tanks, and built a brand-new salamander breeding facility

water chemistry in the Zoo's new facility. After reverse-osmosis filters strip D.C.'s city water of everything but hydrogen and oxygen, the water is then reconstituted to match the Japanese stream samples.

Building Relationships

Japanese giant salamanders are more than just a cultural icon or a symbol for struggling amphibians. The salamanders bring two distinct cultures, with different scientific practices, together in the fight for conservation.

"Whether it's giant pandas, golden lion tamarins, Przewalski's horses, or any of the other endangered species we work with, we are building relationships," says Bronikowski. "That's what the National Zoo does." **SZ**

— Freelance photojournalist CAROLINE TREADWAY is a former Smithsonian Zoogoer intern.



MEGAN MURPHY/NZP

White-naped cranes

*Mating sounds simple. It isn't.
Finding the right match for a Zoo animal
takes hard work and hard science.*

THE MATING GAME

BY BRITTANY GRAYSON

Cuddly bear cubs, awkward elephant calves, fluffy bird chicks, and even precocious newly hatched amphibians are common sights at the Smithsonian's National Zoo. Visitors flock to admire the newest arrival and to exclaim at its endearing awkwardness. Births are often a triumph for zoos. Reproducing in captivity indicates that animals are healthy and well cared for. Sometimes such births are even important on a more global level; species that are endangered or even extinct in the wild augment their numbers by breeding in the protected environment of a zoo.

THE MATING GAME

Births at the Zoo, though, are usually more than just a product of a simple gestation period. This is demonstrably true in the cases of artificial insemination, where Zoo reproductive scientists and veterinarians have had to inseminate the female, watch her closely for signs of a pregnancy, and then monitor her through pregnancy and birth. It is less obvious, though, that every birth at the Zoo takes hours of forethought and planning before conception even occurs. Almost none happen effortlessly.

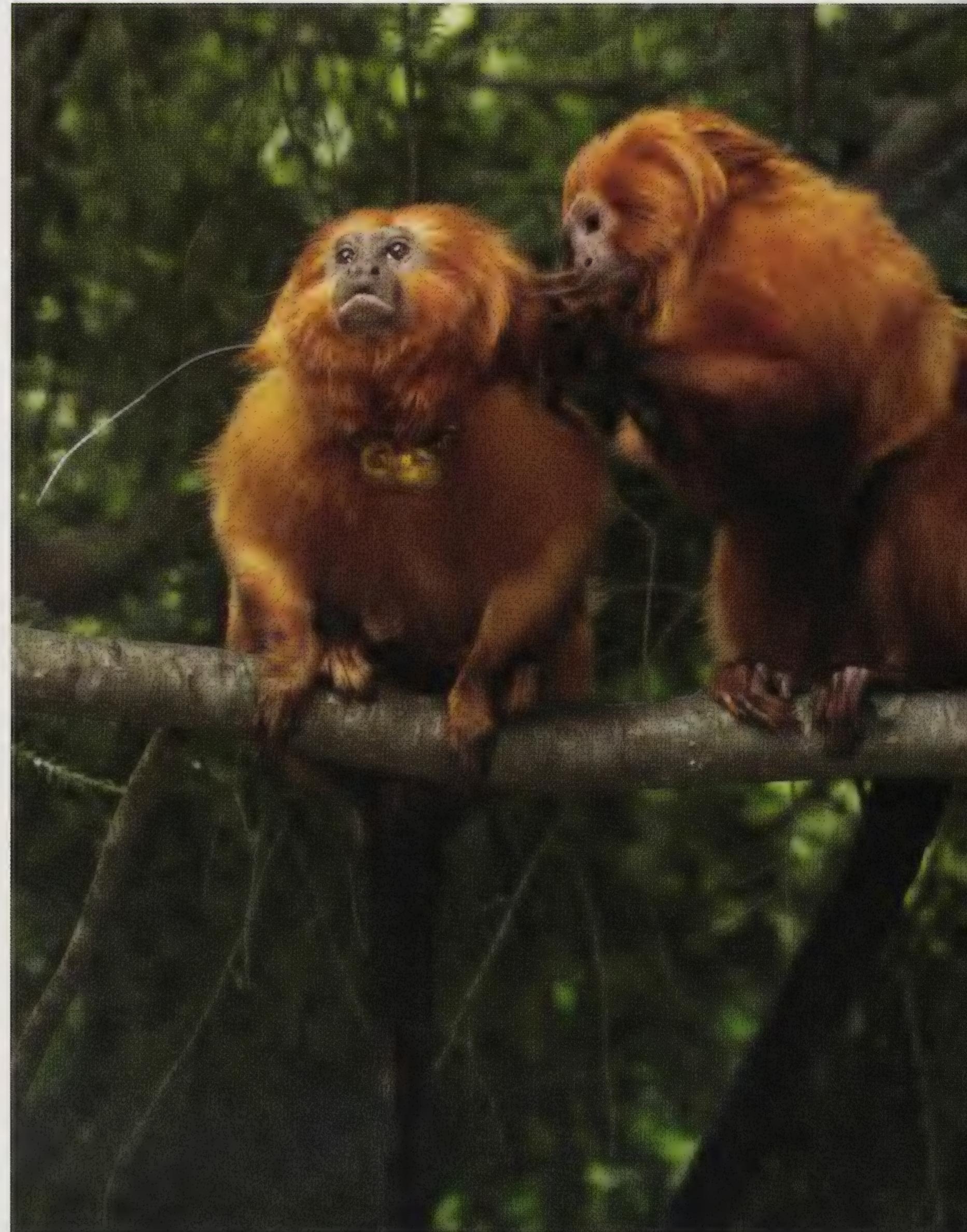
It sounds counterintuitive at first. If a zoo has an endangered species on the premises, why not breed as many as possible? Just put a bunch together in an exhibit and let them handle the rest, churning out as many babies as they can. The reality, though, is that such a plan is not feasible for most zoos. And in many cases, it turns out, it is not even a good idea.

The Evils of Inbreeding

A key problem with letting zoo animals do what comes naturally is the risk of inbreeding. Zoo scientists Jon Ballou and Kathy Ralls conducted one of the first studies of inbreeding in zoos. What they found was that as a population became more inbred, infant mortality increased. Inbreeding can also lead to animals' having fewer babies, dying younger, and suffering from more diseases and abnormalities. The cause lies in the animals' own DNA.

Each organism born from sexual reproduction (most vertebrates and zoo animals) receives two copies of every gene in its body: one copy from its mother and one from its father. That means that an animal has two chances to get a healthy version of every gene, rather than a defective one. When parents are closely related, though, the chances are higher that an animal will get two copies of a defective gene, which gives it a greater risk of inheriting abnormalities and diseases. The more inbred a population is, Ballou and Ralls discovered, the more frequently harmful traits appear. "The genes are already there in the population," Ballou explains. "Inbreeding just uncovers them."

Their study began on dorcas gazelles but quickly expanded to other organisms. Since then, researchers at other zoos all around the country have found similar



results. Zoos started realizing that they had a problem on their hands.

At the National Zoo, Jon Ballou and Devra Kleiman delved deeper into the problem by focusing on golden lion tamarins. They knew the family tree of the current zoo population of golden lion tamarins, including roots that went back to wild ancestors. The family tree, however, was not very helpful to look at. A snarl of black lines, zigzagging back and forth across the page, it looked more like a tangle of blackberry brambles than a royal lineage.

Ballou wanted to find a way to use that family tree to produce a population of golden lion tamarins that was as outbred

(the opposite of inbred) as possible. "We had this mess," Ballou explains. "We spent years trying to figure out how best to do it. And it turned out to be simple."

The process does not look simple in its mathematical form, but the concept is elegant. Ballou and his team looked at each tamarin and, using the family tree, figured out how distantly it was related to every other tamarin in the population. This "mean kinship" allowed them to calculate which tamarins were the least related to each other. Breeding tamarins that were least related to the population overall would result in the most genetically diverse, and healthy, population possible.



In the early 1970s, fewer than 200 golden lion tamarins remained on Earth. Today, there are about 1,500 of these small mammals living in the wild.

MEGAN MURPHY/NZP



MEGAN MURPHY/NZP



JESSIE COHEN/NZP

LEFT: Zoo scientists and veterinarians artificially inseminate a cheetah.
ABOVE: A cheetah tends to a cub.

THE MATING GAME

Ralls and Ballou took another big step forward by organizing a meeting of geneticists from around the country and asking them to give advice on how the captive population should be managed. This meeting took place at the National Zoo's campus in Front Royal, Virginia. Working together, population biologists and zoo scientists agreed that they needed to preserve 90 percent of a population's genetic diversity for at least 200 years for that population to be considered healthy and successful.



Lifeguards in the Gene Pool

Scientists gradually convinced zoo directors that no one zoo had enough animals of each species to meet their goal of maintaining sustainable populations of wild animals, both in zoos and for conservation and reintroduction efforts.

The Association of Zoos and Aquariums (AZA), the body that oversees and accredits North American zoos, took the lead in solving this problem, by creating Species Survival Plans (SSPs). Loosely

based on the recommendations from the meeting at Front Royal and Ballou's golden lion tamarin breeding scheme, SSPs call for looking at animals at every zoo, and breeding the least related to generate a healthy, self-sustaining population.

That seems a herculean task, requiring massive amounts of data and expertise. Not to mention massive numbers of animals. Paul Boyle, senior vice president for conservation and education at the AZA, explains, "What really drove the creation of the SSPs was the realization that even zoos with a large number of animals had nowhere near enough animals to be able to ensure that level of diversity over the long term. You should really have at least 100 individuals in the breeding population, but the more you have, the better off you are. That really drove the realization that the zoological community needed to work as a community, not as a collection of individuals, to ensure these animals' survival."

In 1981, the first SSP was established, and by the late 1980s, many zoo animals, especially charismatic or endangered species, were being managed under this umbrella. "Before that," Boyle explains, "zoos viewed themselves as islands with their local populations. What we have now is truly amazing. Every one of the accredited zoos and aquariums, each with its own collection, manages the collection as if all animals in all accredited zoos and aquariums in North America are actually one single collection, almost a national zoo."

This pooling of zoos' resources has given them many more options in deciding how they breed and manage their populations. It has also given all the animals a better chance at maintaining healthy, sustainable populations in captivity, and at providing individuals for eventual reintroduction programs.

Each species managed by a Species Survival Plan has a species coordinator who in effect looks after every animal of that species in AZA-accredited zoos. That person keeps records of the family tree of each animal in the zoo population, going back as far as possible. Then, with the help of population biologists at the AZA's Population Management Center, the species coordinator uses software based on Jon Ballou's original golden lion tamarin

program and looks at each individual animal in the zoo population. He or she tries to match up animals that are genetically most appropriate for each other, taking facts such as age, location, and breeding history into consideration.

Actually running the software to generate the breeding recommendations is not extraordinarily difficult, according to Ballou—“It would take me five minutes to show you how to do it”—but making breeding recommendations is as much an art as a science. “What looks like an optimal pairing in the genetics may actually not be,” he says, “due to the animals’ location or temperament. A lot of the animals that are valuable are that way precisely because, for whatever reason, they’ve never bred before, despite being given the opportunity.”

Complicated Questions

The breeding guidelines offer zoo scientists and keepers objective information and a way to make science-based decisions about which of their animals they breed or ship to another zoo for breeding. It also prevents zoos from letting individual animals overbreed. Some animals are naturally good at breeding in captivity, but Ballou explains these animals should not be allowed to dominate the gene pool: “The problem with not having scientific breeding recommendations is that the ‘best’ breeders often have the most offspring.” These breeders ‘flood the market,’ so that in the next generation, it becomes difficult to find animals that are not related to each other to breed.”

Allowing breeding to take place without any human intervention could also lead to animals “domesticating” themselves, by adapting to captivity, according to Ballou. Natural selection, which occurs when animals choose their own mates and breed as the opportunities present themselves, produces animals best suited for their current environment. In zoos, those that breed the most, and leave the most descendants in the next iteration of the gene pool, would be the animals that are the most tolerant of life in captivity.

“It may be that the best breeders in captivity wouldn’t be the best breeders in the wild. They may be the ones that tolerate humans, or a captive diet, better than other animals,” Ballou says. Effectively,

the wildness would be bred out of zoo animals, which is exactly the opposite of what SSPs hope to achieve. SSPs strive to avoid breeding for any one trait, or for any suite of traits; they aim to preserve as many traits in the gene pool as possible. You never know what genes will turn out to be important to these animals—for their health, reproduction, or eventual survival if they are reintroduced into the wild.

What about animals that do not breed well in captivity, though? That is where the reproductive science comes in. As Brandie Smith, one of the National Zoo’s senior curators, notes, “You can put two animals together, and they can say, ‘No, thanks!’” Indeed, in

No one had enough animals of each species to achieve their goal of maintaining sustainable populations of wild animals, both in zoos and for conservation and reintroduction efforts.

some cases, due to personality clashes or a lack of familiarity with breeding situations, animals can actually hurt each other.

That is what happened with a pair of endangered white-naped cranes at the Smithsonian Conservation Biology Institute in Front Royal. A male and a female, both hand-reared by humans, had never bred, and so both were extremely valuable genetically. With only about 5,000 white-naped cranes left in the wild and 60 in North American zoos, every unique gene counted. Because of their human upbringing, neither bird knew how to behave as a proper crane—and cranes have very specific courtship behavior. In this case, keepers ended up collecting semen from the male and artificially inseminating the female, producing the much-desired and highly valuable chick, who was reared by her grandparents.

Of course, artificial insemination is not always possible or practical. Scientists only

know how to successfully artificially inseminate a fraction of zoo species, though they are working on more every day.

But what about the opposite: How do you keep the best breeders from overbreeding? The answer is that many zoo animals are on contraceptives. Zoo contraception can include oral pills, subdermal patches, hormonal injections, or simple separation during fertile periods.

Contracepting an endangered species may sound counterintuitive, but it is one of the best tools for keeping zoo animal populations healthy. Smith explains, “Contraception means we can keep animals in their natural social environments. It prevents breedings we don’t want, while allowing animals to live in a more natural social setting.”

Building an Ark Together

More SSPs continue to be established every year. This spring, the AZA is reviewing the SSP system, analyzing its strengths and looking at what areas could improve. Boyle, who is helping to lead this effort, says that, in general, the SSP program is an awe-inspiring concept.

“The notion of cooperative animal management is truly an amazing outcome,” he says. “All these zoos and aquariums have their own collections, and what they’ve agreed to do, with no law saying it should happen, no coercion, is to work together because they all recognize the power these amazing collections have to connect people to the wild. More and more, we’re dependent on the power of zoological collections to fill people’s minds with the wonder of these amazing animals.”

The more zoos inspire people, zoo staffs hope, the more species, and the more of the planet’s biodiversity, they may be able to save. It is an uphill battle and, like trying to fit some 5,000 species of mammals onto one boat, a daunting one. The scientists, however, do not seem to be considering giving up.

“The planet is falling apart,” Smith says, in the manner of one rolling up her sleeves and getting down to work. “Everything needs to be saved.” **SZ**

— BRITTANY GRAYSON is a web content editor and science writer for Friends of the National Zoo.

...Menu...

Amuse-bouche

Whet your appetite at Friends of the National Zoo's annual fundraising gala. This enchanted evening brings together an array of delights for all your senses. ZooFari 2010 celebrates our care and conservation work with giant pandas. Proceeds benefit animal care, science, and education programs at the National Zoo.

Hors d'oeuvres

Begin your culinary adventure with cooking demonstrations from renowned area chefs. Bid on auction items in advance at www.biddingforgood.com/fonz. Enjoy live music while strolling through the Zoo. Special animal demonstrations and exclusive exhibit tours* satisfy your appetite.

Entrée

Savor exquisite tastes from more than 100 Washington-area restaurants. From soups and salads to sustainable seafood and exotic entrées, an extensive menu awaits your palate. Pair your meal with wine selections from 15 vintners to round out your evening.

Dessert

Satisfy your sweet tooth at the ZooFari Sweet Spot, the new dessert area. Coffee will also be served.



Thursday, May 20 from 6:30 to 9:30 p.m.

Smithsonian's National Zoo

This event is rain or shine. Children under two are free. No strollers. Cocktail attire.

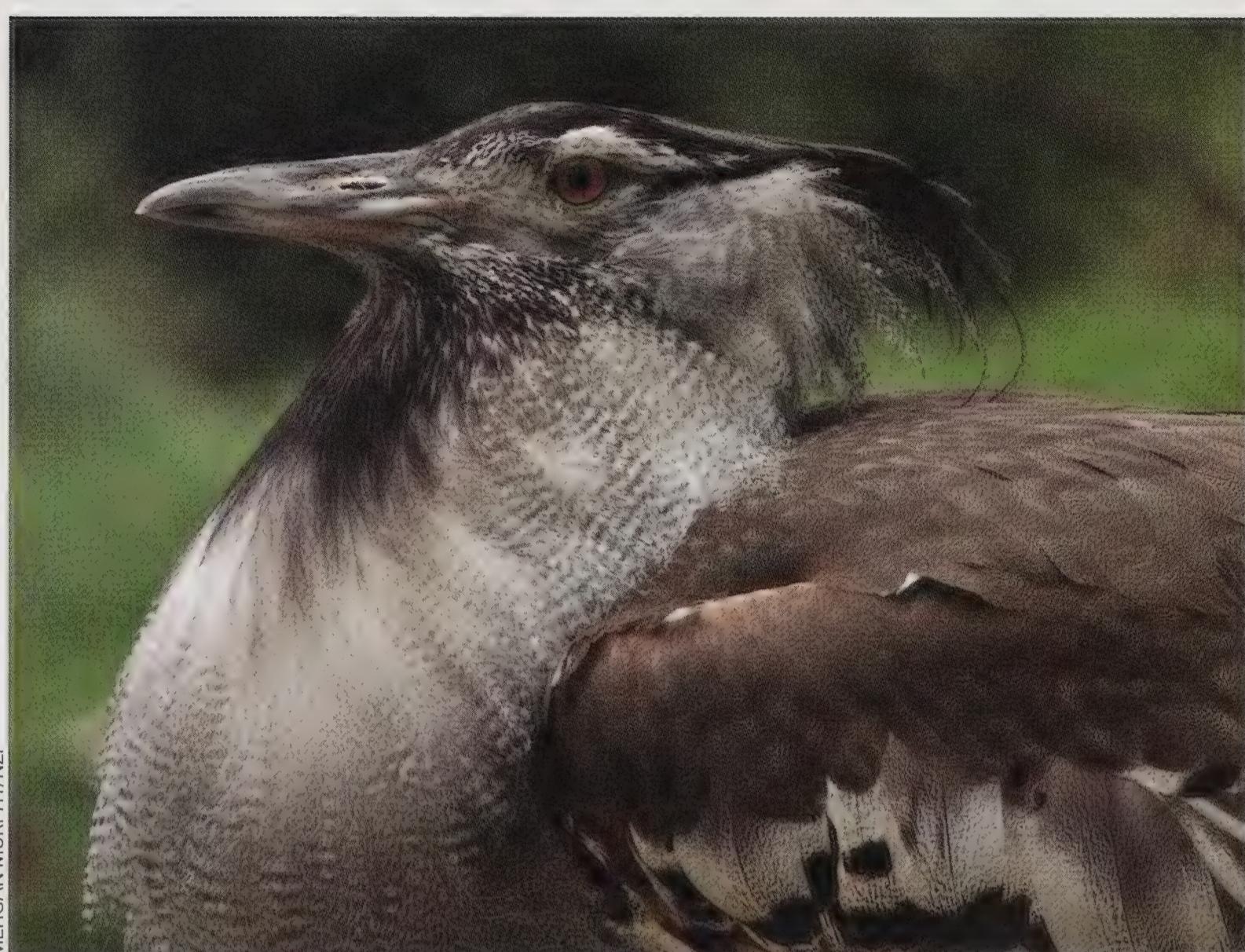
*Exhibit tours are available to table buyers only.

Order tickets at www.fonz.org/zooftari.htm.



ANIMALIA

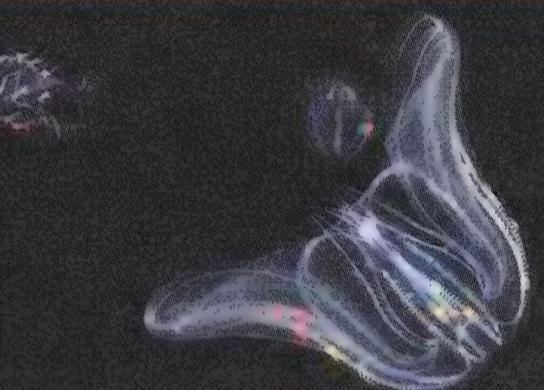
BY CAROLINE TREADWAY



Where in the Zoo?

What's missing from this transparent creature—and 99 percent of all known species? Find the answer at nationalzoo.si.edu/goto/whereinthezoo.

MEGAN MURPHY/NZP



Yet koris have a major edge over emus, rheas, and cassowaries: They can fly. They are the heaviest birds that can do so.

Kori bustards are omnivorous, eating insects, berries, small mammals, lizards, and snakes. When courting, a male signals his ardor by puffing up his esophagus to four times its normal size. The display can be seen a kilometer away.

Facing habitat destruction and other threats, these big birds may vanish from some of their fragmented home ranges. So the Zoo has spearheaded an effort to breed and conserve koris worldwide. According to Zoo biologist Sara Hallager, the National Zoo has produced more kori chicks than any other zoo in North America. The Zoo's success was recently honored with a Plume Award from the Association of Zoos and Aquariums' Avian Scientific Advisory Group.

SUPERLATIVE Heaviest Flying Bird

Weighing in at 11 to 40 pounds apiece, the Zoo's kori bustards (*Ardeotis kori*) seem positively petite compared with some of their avian neighbors here at the Zoo.

MEGAN MURPHY/NZP



DID YOU KNOW?

Good Morning, Madagascar!

Manned wolves greet the sunrise with

a howl. Gibbons squawk.

And ring-tailed lemurs

(*Lemur catta*) have their own rise-and-shine ritual—sunbathing. Perched

on a rock or balanced on

a branch, the primates

stretch their arms toward the sun and expose their bellies to catch rays. Zoo

primate biologist Laurie

Thompson believes this

behavior started as a way to warm up after chilly nights in the animals' forest habitat.

FACT OR FICTION? Tenrecs Turn Into "Pin Cushions" When Threatened

FACT. Small mammals from Madagascar, tenrecs resemble hedgehogs. A tenrec discourages predators with a "stop, drop, and roll" defense, curling up into a ball and flexing its back muscles. This causes the sharp, modified hairs on its body to stick straight out like defensive spines. Faced with a sharp, spiky "pin cushion," many predators move on in search of an easier meal.

Madagascar boasts nearly 30 species of tenrecs. You can see two kinds of these nocturnal, insectivorous creatures in the Small Mammal House.

JESSIE COHEN/NZP





SPINELESS WONDERS

With eight arms, octopuses can really grab your attention.

BY PAMELA
BUCKLINGER

NO-BONE ZONE » Octopuses are among the most fantastic creatures in the ocean. They're invertebrates, meaning they don't have backbones—or any bones, for that matter. These spineless wonders are super flexible and can squeeze through very small spaces to avoid predators. The only hard part of an octopus is in its mouth—a parrot-like beak.

SUPERSIZE SEA CREATURE » Octopuses come in a wide range of sizes and colors. Most that live in warm, tropical waters are fairly small. Those in colder waters grow much larger. The biggest octopus of all is the giant Pacific octopus. It can be 10 to 23 feet across and weigh 100 pounds. Large or small, octopuses move the same way. They suck water into their bodies. Then they squirt it out. The jet of water pushes the octopus along, its long arms trailing behind it.

THINK INK » Octopuses are shy. They'd rather flee than fight. They can also change how they look in a snap. That allows them to hide from enemies by blending in with their surroundings. If flight and disguise don't work, octopuses have yet another survival tool—ink. An octopus can squirt out ink to create a black cloud in the water. That distracts the predator, giving the octopus a chance to flee and hide.

ARMED AND DANGEROUS » Octopuses have eight arms. These all have suckers on the undersides. Octopuses use their suckers to catch prey, such as crabs, mollusks, and crayfish that live on the ocean floor. In extreme cases, octopuses have been observed eating fish (including sharks) and even birds. These stealthy animals hunt at night, with a highly developed sense of sight that lets them see in dark, deep water. They also have an excellent sense of touch. Sensory receptors on the bottom of their suckers let octopuses "taste" whatever they touch. As soon as prey is within reach, an octopus grabs it with its long arms and secretes saliva that

GET A GRIP ON OCTOPUS FACTS

- Octopuses are intelligent animals that can distinguish between shapes and patterns and learn skills. For example, an octopus in captivity can learn how to unscrew the top of a jar to get at the crab inside.
- Octopuses may live in holes or crevices of rocks. Some protect themselves by piling up rocks like a fort.
- Octopuses have three hearts. Two pump blood through the gills, while the third pumps blood through rest of the body.
- Octopuses can't hear.
- If an octopus loses an arm to a predator, it can grow a new one in six to eight weeks.
- Octopus blood is blue, not red.
- While octopus moms lay thousands of eggs, only a few survive to adulthood.
- Predators of the giant Pacific octopus include the harbor seal, sperm whale, and sea otter.



MEGAN MURPHY/NZP

stuns the prey. It then uses its hard beak to crack open the prey's shell. As if that were not enough, octopus saliva also contains venom. It weakens prey so an octopus can pull it from its shell.

OCTO-MOM » The life span of an octopus varies by species. Smaller types live for just six months, while larger ones can live for several years. For most octopuses, having babies means the end of their own lives. Males die within a few months of mating. A female lays 20,000 to 100,000 eggs in many strings, which she hangs in her den. She guards the eggs obsessively, cleaning and aerating them until they hatch. That can take as long as seven months. During this time, the female can't hunt, so she gets weak from starvation. Some moms-to-be will actually chew on their arms!

AT THE ZOO » Oceans of fun await you at the Zoo's Invertebrate Exhibit, home of our giant Pacific octopus. Feedings are scheduled at 11 a.m. and 3 p.m. each day.

Swim Through the Air With an OCTOPUS KITE

MATERIALS

- Large paper bag
- Decorations for bag (paint, crayons or markers, glitter and glue, google eyes)
- Scissors
- String or yarn
- Ribbon or crepe paper
- Tape or staples

DIRECTIONS

- Decorate one side of your bag. Remember to keep the materials light.
- Make three holes near the mouth of the bag, one on each undecorated side. Reinforce the holes with tape.
- Tie two short pieces of string to the holes on the short sides of the bag.
- Tie a long piece of string to the remaining hole.
- Tie the three strings together to form a line for your kite.
- Tape or staple eight ribbons or crepe paper streamers to the bottom of the bag to form tentacles.
- Take your kite outside and **run fast!**



FONZ EDUCATION DEPARTMENT



Contact Dr. Connie Blackfoot at 202.633.4490 or blackfootc@si.edu. nationalzoo.si.edu/education/savepdp



MEGAN MURPHY/NZP

[RESEARCH REPORT]

Building a Pride Zoo scientists are boosting lions' social lives.

For the first time in more than 20 years, the Smithsonian's National Zoo has the right combination of lions (*Panthera leo*) to attempt to build a pride. But doing so takes more than merely putting the Zoo's three lions—Luke, Nababiep, and Shera—together and hoping they get along and breed. It is a challenge that requires extensive planning, knowledge of the species' natural history, and an understanding of the individual animals involved.

"Animal keepers spend a considerable amount of time observing the behavior of individuals and getting to know their temperaments," says Craig Saffoe, acting curator of lions and tigers. "Even though lions are a social species, introducing individuals who are not familiar with each other can be highly dangerous. Any of these animals can hurt or kill the other if we don't do our job well."

So far, the research and patience have paid off. The sisters, Nababiep and Shera, have spent short periods of time, both individually and together, with the unrelated male, Luke. This happened only after the females had spent nearly a year sniffing Luke through a mesh door (called a "howdy door"). Keepers observed the animals' reactions to one another to determine how they might respond face-to-

face. The next step is to put them together outdoors, giving visitors an opportunity to see the pride, which could someday have nearly a dozen members. (Female lions usually give birth to between two and four cubs.)

Lions are the most social of the big cats, many of which are solitary animals. In the wild, a typical male becomes the resident male in a pride, which consists of related females and offspring, at the age of four. The Zoo's pride would simulate more natural circumstances for the lions. "Because lions naturally live in social groups, introducing our lions into a common territory provides social enrichment," said Rebecca Stites, a lion and tiger keeper. It will also help improve general knowledge of the captive management of African lions, which are considered a vulnerable species.

The National Zoo consulted about a dozen other institutions for tips about building a pride and will be conducting its own research to contribute to the North American Species Survival Program for African lions. A team of volunteers will assist keepers in observing how the Zoo's lions spend their time, how close they stay to one another, and what times of the day they engage in social play, breeding behavior, and territorial marking.

A new event is blooming.

Family Garden Day at the Zoo
Saturday, July 10
10 a.m. - 4 p.m.

Don't miss a new FREE event celebrating the gardens of the Smithsonian's National Zoo. Explore the beauty of Zoo horticulture and how plants and animals coexist. Learn what you can do in your own backyard, hear updates on the Zoo's botanical garden status, and enjoy gardening displays and activities for kids. Find out more at www.fonz.org/gardenday.htm.

**Corporate events
that let you escape
the urban jungle.**

Get out of the office and celebrate your contribution at the National Zoo! You'll feel good knowing your corporate donation supports Zoo conservation programs. Our urban oasis in the heart of the city will provide your guests with a magical event setting surrounded by exotic animals. Whether casual or formal, large group or small, company party or team building, the Zoo offers an affordable, flexible, and fun setting for your event. Call 202.633.3045 and reserve your site today. Let us show you how a little escape will make you feel great.

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www.fonz.org

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202.633.2922

Special Events
202.633.4470

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202.633.4470

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202.633.3025

Comments? Questions?

Please email us at
member@fonz.org

Not a FONZ
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Call 202.633.3034
or go to
www.fonz.org/join.htm

SPRINGTIME EVENTS

FUNDRAISING GALA

ZooFari: A Panda Bear Affair »

May 20, 6:30-9:30 p.m.
Delight your palate with
offerings from more than
a hundred Washington
restaurants and your ears
with live music—all at
Friends of the National Zoo's
annual fundraising gala.
Order tickets at www.fonz.org/zoofari.htm.



MEGHAN MURPHY/NZP



MEGHAN MURPHY/NZP

NEW, FREE EVENT

« Family Garden Day July 10, 10 a.m.-4 p.m.

Explore the beauty of Zoo horticulture and learn how plants and animals coexist. Get tips for improving your own garden and watch the kids enjoy special activities for young people. Learn more at www.fonz.org/gardenday.htm.



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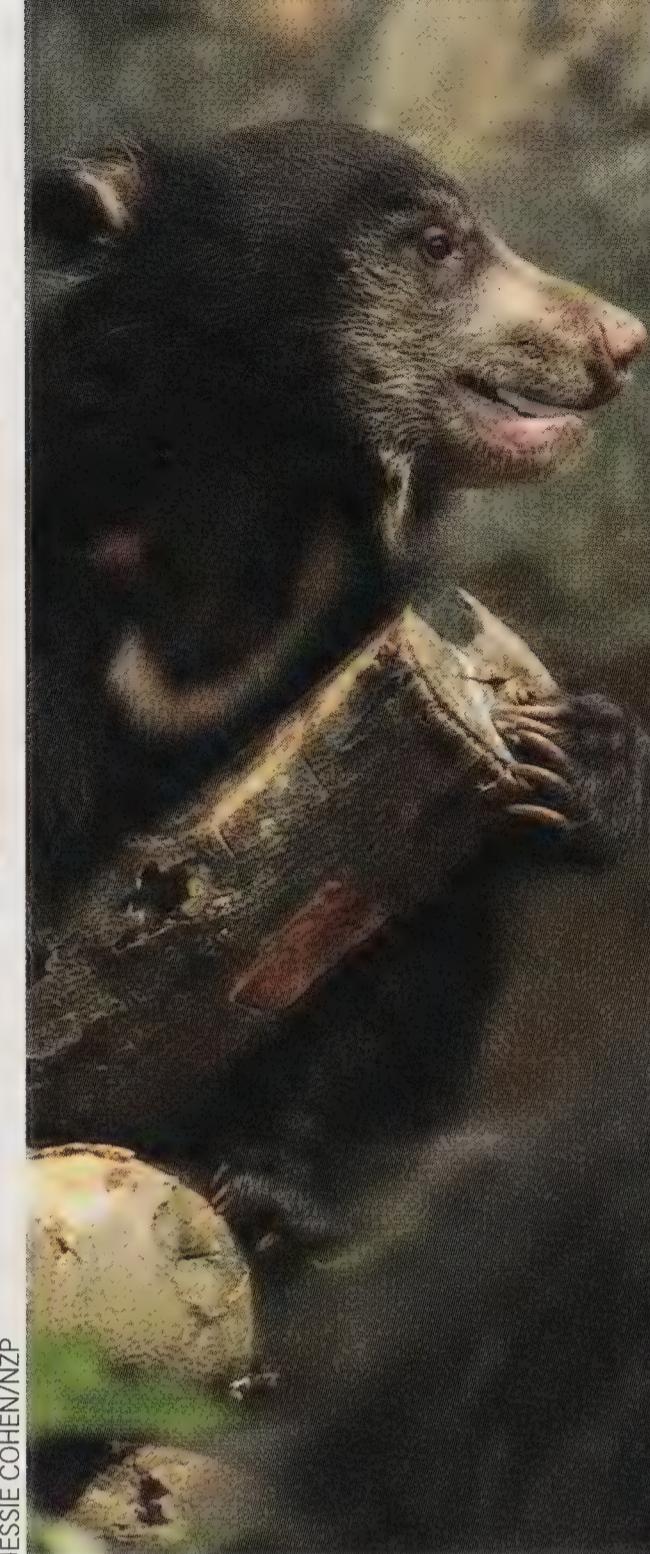
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FONZ CLASSES

ADULT/CHILD CLASSES

These programs invite adults and children to discover the Zoo together. All children must be accompanied by an adult. For everyone's safety and enjoyment, unregistered children and siblings may not attend—except for infants who do not yet crawl.



JESSIE COHEN/NZP

Animal Sensations

This is so much more than "one, singular sensation" It's five! All animals have keen senses that help them survive in a dangerous world. Some have a great sense of smell; some can feel with their whiskers. Come explore sensational animals with your five senses and learn what it means to see with your nose or hear with your hairs.

AGES 2-3
DATE May 22
TIME 10-11:30 a.m.
Fee \$25



Swinging Safari

There's no need for a passport when you can explore the savanna at the National Zoo! Take part in crafts and games as you learn about African animals and culture. We're not lion: It's going to be a wild time!

AGES 2-3
DATES Session 1: May 25; June 1, 8
Session 2: May 26; June 2, 9
Session 3: May 27; June 3, 10
Session 4: May 28; June 4, 11
TIME 10-11:30 a.m.
Fee \$75

Register Online at
www.fonz.org/classes.htm

Children's classes and programs are open to FONZ members at the household level or above. Classes meet in the Visitor Center unless otherwise noted.

FONZ CLASSES



CHILDREN'S WEEKEND WORKSHOPS

Parents are not encouraged to stay with the class, but may if they wish (for no charge).

The Three Bears

Goldilocks' tale would be a bit different if she had visited the National Zoo! Take a trip and visit the homes of our three bears: giant pandas, sloth bears, and Andean bears! Join us for bear-y fun classroom activities that we're sure Goldilocks would find "Just right!"

AGES 2-3
DATE June 6
TIME 10-11:30 a.m.
Fee \$25

Funky Monkeys

Be sure to "get down" to Amazonia for a morning of song and dance with the animals of South America. Make music and fun as we learn about the monkeys, birds, and amphibians. Be "Kool" and join "the Gang" on this jungle boogie!

AGES 2-3
DATE June 13
TIME 10-11:30 a.m.
Fee \$25

HOME EDUCATION CLASSES

Attention all home educators! Contact us at fonz_programs@si.edu if you are interested in setting up an education program that can meet your specific needs.

Monkey Mania

It's a primate party, and you're invited! Prosimians, monkeys, and apes, the gang's all here! What are the differences among human relatives, large and small? Visit the greatest apes and the smallest monkeys and make special treats that primates—like you—can eat, too.

AGES 4-6
DATE May 23
TIME 10-11:30 a.m.
Fee \$28

Tunnel Vision

Can you dig it? Explore the underground world of tunnels and meet some of the many animals that live underground. Visit black-footed ferrets, prairie dogs, naked mole-rats, meerkats, and leaf-cutter ants for a look at the dirty dwellings of these industrious diggers.

AGES 6-9
DATE June 5
TIME 10 a.m.-12 p.m.
Fee \$28

Turtle Power!

Calling all dudes and dudettes! Come check out our own heroes in a half shell as you explore the lives and habitats of turtles. Rad games and activities will ensure that a shell of a time will be had by all!

AGES 4-6
DATE June 13
TIME 10 a.m.-12 p.m.
Fee \$28

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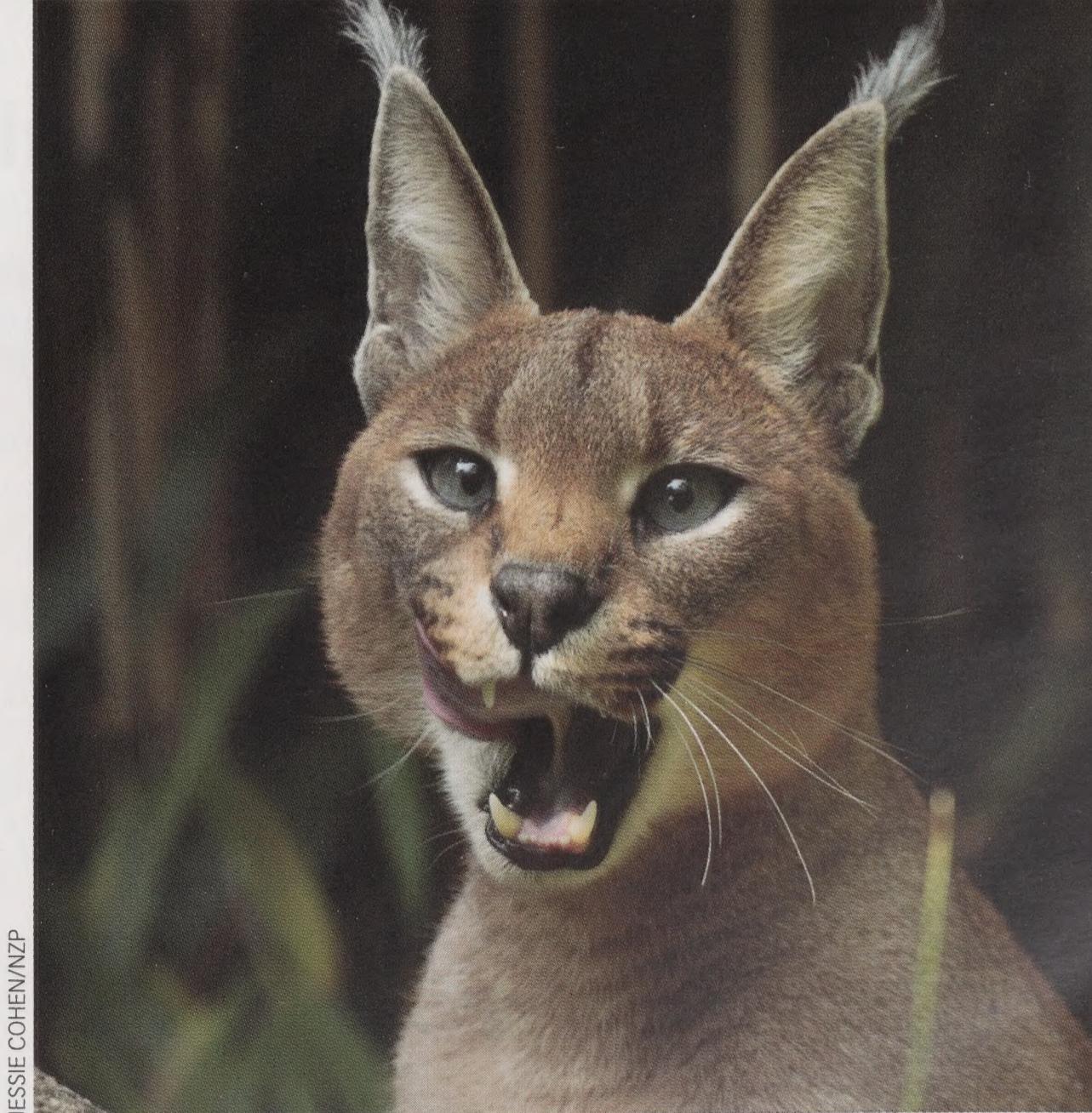
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MEHGAN MURPHY/NZP

Wild Thing

Since joining the Zoo staff in 2006, photographer Mehgan Murphy has captured images of creatures great and small. Usually, she goes in search of animals to photograph, but sometimes they come to her. That happened one day as she was shooting at a pond near the Bird House. A dragonfly landed on a lotus, creating a striking photo—a vivid reminder that the Zoo, however girdled by the city, remains a wild place.

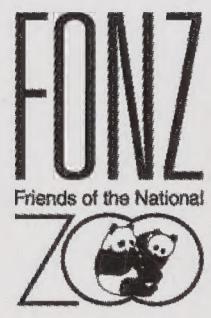
Smithsonian Zoogoer welcomes FONZ members' submissions for the Zoo View page. Please send photos to zoogoer@si.edu. We will contact you if we are able to use your picture.

Technical Notes — CAMERA: Canon EOS-1D Mark III;
EXPOSURE: F5.6 at 1/400 second; FOCAL LENGTH: 400 mm

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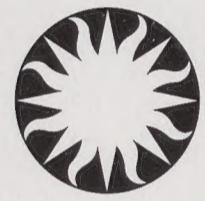


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